

CLAIMS

What is claimed is:

1. A solder composition comprising copper added to a non-copper bearing solder.
2. The solder composition as defined in claim 1 further comprising copper added to a non-copper bearing eutectic solder.
3. The solder composition as defined in claim 1 further comprising copper added to a solder selected from a group of solder compositions comprising: tin-lead, tin-bismuth, tin-zinc, and tin-indium.
4. The solder composition as defined in claim 3 wherein the copper further comprises between 0.6 weight percent (wt.%) and 4 wt.%.
5. The solder composition as defined in claim 1 further comprising copper added to a tin-lead solder.
6. The solder composition as defined in claim 5 further comprising copper added to a eutectic tin-lead solder.
7. The solder composition as defined in claim 5 wherein the solder composition comprises between 40 weight percentage (wt.%) and 97 wt.% lead (Pb), and between 3 wt.% and 60 wt.% tin (Sn) respectively.

8. The solder composition as defined in claim 5 wherein the copper further comprises between approximately 0.6 weight percent (wt.%) and 4 wt.%.
9. The solder composition as defined in claim 1 further comprising CuSn_5 precipitate formed during reflow.
10. A method of making a solder composition comprising adding copper to a eutectic tin-lead solder.
11. The method as defined in claim 10 wherein the eutectic tin-lead solder is selected from compositions comprising: 40 weight percent (wt.%) lead (Pb) and 60 wt.% tin (SN); 97 wt.% lead and 3 wt.% tin; 95 wt.% lead and 5 wt.% tin; and 90 wt.% lead and 10 wt.% tin.
12. The method as defined in claim 10 further comprising adding copper in amounts of between approximately 0.6 weight percent (wt.%) and 4 wt.% of the total eutectic solder composition.
13. The method as defined in claim 10 further comprising using the eutectic tin-lead solder and copper composition to form a solder interconnect.
14. An electronic assembly formed by a method comprising:

bumping a first substrate with solder bumps comprising copper mixed with a non-copper-bearing tin-based solder;

positioning the first substrate adjacent to a second substrate, such that the solder bumps of the first substrate abut solder pads on the second substrate; and

heating the assembly such that the solder bumps at least partially melt, thereby forming a solder joint between said first and second substrates.

15. The electronic assembly as defined in claim 14 wherein said first substrate comprises a die and wherein said second substrate comprises a package substrate.

16. The electronic assembly as defined in claim 14 wherein the solder pads each comprise an outer gold layer, an underlying nickel layer and a copper base.

17. The electronic assembly as defined in claim 16 further comprising diffusing gold from the outer gold layer of the solder pads into the solder bumps when the assembly is heated.

18. The electronic assembly as defined in claim 17 further comprising precipitating Cu_6Sn_5 within the solder bumps.

19. A method of soldering electronic components comprising forming a solder interconnect comprising tin, lead and copper onto a solder pad comprising nickel and gold.

20. The method as defined in claim 19 wherein forming further comprises forming the solder interconnect selected from the group consisting of a solder bump on a flip-chip die, a solder ball on a package substrate, and solder ball on a printed circuit board.

21. The method as defined in claim 19 wherein forming further comprises forming a solder interconnect onto the solder pad where the nickel in the solder pad is selected from the group comprising pure nickel and electroless nickel.